MONTHLY WEATHER REVIEW.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for August, 1903, is based on data from about 3300 stations, classified as follows:

Weather Bureau stations, regular, telegraph and mail, 160; West Indian Service, cable and mail, 8; River and Flood Service, 52, river and rainfall, 177, rainfall only, 62; voluntary observers, domestic and foreign, 2565; total Weather Bureau Service, 2962; Canadian Meteorological Service, by telegraph and mail, 20, by mail only, 13; Meteorological Service of the Azores, by cable, 2; Meteorological Office, London, by cable, 8; Mexican Telegraph Company, by cable, 3; Army Post Hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Company, 96; Hawaiian Meteorological Service, 75; Jamaica Weather Service, 130; Costa Rican Meteorological Service, 25; The New Panama Canal Company, 5; Central Meteorological Observatory of Mexico, 20 station summaries, also printed daily bulletins and charts, based on simultaneous observations at about 40 stations; Mexican Federal Telegraph Service, printed daily charts, based on about 30 stations.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Territorial Meteorologist, Honolulu, H. I.; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut. Commander W. H. H. Southerland, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San José, Costa Rica; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. M. Shaw, Esq., Secretary, Meteorological Office, London; Rev. Josef Algué, S. J., Director, Philippine Weather Service; and H. H. Cousins, Chemist, in charge of the Jamaica Weather Office.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′, or $10^h\ 30^m$ west of Greenwich. The Costa Rican standard of time is that of San José, $0^h\ 36^m\ 13^s$ slower than seventy-fifth meridian time, corresponding to $5^h\ 36^m$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

THE WEST INDIAN HURRICANE OF AUGUST 8-15, 1903.

The most important tropical storm that has appeared in North American waters since September, 1900, advanced from Barbados, West Indies, over the Caribbean Sea and the Gulf of Mexico from the 8th to the 15th.

The first indication of the presence of this storm to the eastward of Barbados was furnished by the morning telegraphic reports of the 8th. West Indian stations and Gulf and Atlantic coast shipping interests were at once notified that a disturbance probably of dangerous strength was approaching Barbados from the eastward and would move northwestward over the Windward Islands. Thereafter daily until the 14th, West Indian, Gulf, Atlantic stations, and shipping interests were advised of the apparent location and character and the probable course of the storm, and as it passed westward over the Caribbean Sea hurricane warnings were ordered at Gulf and southern Florida stations. The storm increased in strength as it advanced in a north of west course over the Caribbean Sea, and apparently attained its maximum intensity as it approached the Yucatan Channel.

Martinique appears to have been the only island of the Windward Group that suffered serious damage. The vortex of the storm passed over or near that island moving in a northwesterly direction during the night of the 8-9th, unroofing several hundred houses, destroying crops, and damaging a number of sailing vessels.

During the next two days the center of the storm was far distant from any station of observation. Shipping interests and West Indian stations were, however, advised that while reports from that region were missing a disturbance of apparently marked energy was moving north of west over the Caribbean Sea near Santo Domingo. On the morning of the 11th the presence near Jamaica of a storm of great intensity was indicated and advices to that effect were issued with a warning that it was considered dangerous for vessels of all classes to sail for Gulf, Cuban, and South Atlantic ports.

Reports from Kingston, Jamaica, show that the first effects of the storm were felt on that island on the 10th, and that the main hurricane center reached the island on the morning of the 11th, causing a heavy loss of life and property. At Kingston the minimum barometer, 28.80 inches, as indicated by the barograph, occurred at 5:30 a. m. of the 11th, and at 6:15 a. m. the barometer had risen to 29.36 inches. The anemometer cups were disabled, but the maximum wind velocity at Kingston was estimated at 65 miles an hour. The principal sufferers were the owners of banana plantations whose losses were estimated at more than £500,000. The orange, pimento, and coffee crops suffered severely; the towns of Port Antonio and Port Maria were almost destroyed, and throughout the parishes of St. Mary, Portland, St. Andrew, St. Catherine, and St. Thomas the destruction to houses, property, and plantations was appalling. Kingston, with the exception of damage to houses and warehouses on the sea front, suffered less than any other place on the island.

But little information is available for determining the character and course of the storm after it passed Jamaica. Warnings were, however, issued that the storm was severe and likely to enter the Gulf of Mexico. Later advices show that the Cayman Islands were devastated on the evening of the 11th. Captain Hunter of the schooner *Gov. Blake* has furnished notes regarding the storm at Georgetown, Grand Cayman Island. According to his observations the 8th and 9th were clear and bright at Grand Cayman Island. The 10th was unusually warm with a north-northeast wind that freshened steadily. In the afternoon the weather became cloudy and a little rain fell in the evening. From 8 a. m. to 8 p. m., local time, the barometer fell from 29.80 to 29.70 inches. At 1 p. m. of the 11th the barometer read 29.50 inches, the wind was blowing about 30 miles an hour from the north-northeast, and the sky was covered with thick, black clouds from the same quarter. At 4 p. m. the wind was blowing about 45 miles an hour, and at 5 p. m., with the barometer at 29.30 inches, the wind was blowing in heavy gusts at 65 miles, and the clouds hung so low that they seemed to almost touch the tree tops. At 7 p. m. the roaring of the wind began, and at 8 p. m., with the barometer reading 29.00, the wind blew at 90 miles an hour in terrific gusts that churned up the water in the harbor of Georgetown and blew out to sea or capsized several vessels. At this time, 8 p. m., it was supposed that the worst of the storm had passed, but soon the barometer began to fall so rapidly that the needle of the aneroid could be seen to move. The barometer fell until 10 p. m. when it stood at 28.30 inches, with the wind blowing 110 to 120 miles an hour from east-northeast to east-southeast in gusts. About midnight it became almost calm for about thirty minutes, after which the wind came on fiercely from the southeast. At 1 a. m. of the 12th the barometer began to rise, and at 6 a. m. it read 29.30, and at noon 29.70. From midnight until 4 a. m. heavy rain continued in drops as large as gravel stones and with nearly the same abrasive effect. When the sun came out on the morning of the 12th a most desolate sight was presented. Every tree and plant on the island was either blown away or had its leaves and small branches stripped off, and crops were entirely destroyed. About 200 houses were blown down or unroofed, seven out of eight churches on the island were destroyed, vessels on the stocks were picked up and dashed to pieces, and of the 23 vessels in the harbor of Georgetown but one, the *Gov. Blake*, was saved. Most of the crews on board perished, but no one on shore was killed. The wind exhibited some curious freaks, totally demolishing some houses while others close by were not damaged.

Havana, Cuba, reports of the 12th indicated the approach of the storm center toward the southeastern part of the Gulf of Mexico, and advices to this effect were issued. On that date some destruction by high wind was caused to buildings and crops in the province of Pinar del Rio, Cuba.

Reports from Havana on the morning of the 13th appeared to locate the center of disturbance in the southeastern part of the Gulf of Mexico. A report received late in the day from Progreso, Yucatan, indicated that the center of the storm was near the northeast coast of Yucatan, and heavy sea swells were reported at Pensacola, Fla., and Fort Morgan, Ala. Reports from various sources indicate that the storm was very severe on the Yucatan coast and adjacent waters of the Gulf during the 13th. The captain of the steamship *Navarre* reports that he left Vera Cruz, Mexico, at 11 a. m., August 12, course 62° north, barometer 30.04, weather fine, and fresh breeze from east-northeast. At 1 a. m. of the 13th, when approaching The Triangle on the border of Campeachy Banks, the weather, though still fair, began to change, particularly in the north-northeast, where the sky was copper colored. The barometer had fallen to 29.88, with some heavy showers from the north-northeast, and a slight swell from the northeast.

At 5 a. m., in 21° 24′ north, 94° west from Paris (91° 40′ west from Greenwich), a squall from the northeast struck the vessel, the sea became heavy, the barometer had fallen to 29.76, the sky was overcast, and the wind increased in strength and shifted to north-northeast, to return to northeast at 11 a. m. At noon, in 21° 58′ north, 90° 5′ west from Greenwich, the weather had become stormy, the sea rougher and rougher, and by 2 p. m. the wind had increased to hurricane force from the northeast, the vessel was head on the waves, and the barometer had fallen to 29.61.

Between 3 and 6 p. m., when 15 miles south of the Alacranes, the hurricane was encountered in its full fury, the barometer reading 29.45, and the sea exceedingly rough. At 7 p. m. the worst of the storm had passed, the wind had shifted to the eastward, and the sea became less rough. At 8 p. m., in north 22° 25′, west 89° 5′ from Greenwich, the barometer had risen to 29.65, the wind had changed to east-northeast, and the sea had become calmer. At 11 p. m. the steamer resumed its usual speed, and continued on its course with fair weather.

Following a north of west course the vortex of the storm apparently reached the coast of Tamaulipas, Mexico, on the 15th, where it dissipated. Attending its passage many vessels were cast ashore on the coast of Yucatan, shipping and property were damaged from Yucatan to Tampico, and large tracts of the southern Gulf coast were submerged.

The approximate path of this hurricane from the 8th to the 15th is shown on Chart No. X.

When the fact is considered that, except during its passage over Jamaica, the hurricane center did not come within the region of telegraphic observation the difficulty experienced in defining its probable future course will be appreciated. With the ever present probability of a northward recurve of the storm, shipping interests were daily advised of the danger of sailing for southern waters that lay in its possible line of advance, and many disasters were doubtless averted by an observance of the warnings.

Freshets occurred at intervals during the month in the streams of the lower Missouri Valley.

On the 4th storm warnings were ordered from New Haven, Conn., to Boston, Mass., and during the 5th a northeast gale caused damage to small vessels along the southern New England coast. From the 29th to 31st strong easterly winds prevailed on the middle Atlantic and southern New England coasts.

No serious damage by frost was reported during the month.

BOSTON FORECAST DISTRICT.

Local storms of marked violence occurred on the 5th and 19th, the former covering a large portion of Connecticut, while the latter was most severe in Vermont. A northeast gale, with rain and fog, prevailed along the coast on the 29th and 30th, delaying shipping and causing some damage to small craft. Timely warnings were diplayed in connection with the storms, and no destructive winds occurred without warning.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

Advisory warnings concerning the tropical hurricane that moved westward across the Caribbean Sea and the Gulf of Mexico proved of great value to shipping interests. Much damage was sustained by vessels that sailed into this storm, and several were reported lost. Many vessels remained in port until it was evident that they could pursue their course without danger.—*I. M. Cline, District Forecaster.*

CHICAGO FORECAST DISTRICT.

No storm warnings were displayed during the month, but advisory messages for severe local squalls were sent to most of the Lake ports August 5, and to those on Lake Superior on the 17th. On the night of the 20th advisory messages were sent to Lake Superior points for southerly gales, due to the approach of a storm of decided energy which had formed in Assiniboia.